PREPARING AND USING SHARED VISION MODELS FOR THE APALACHICOLA-CHATTAHOOCHEE-FLINT WATERSHED

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BACKGROUND

Study Area

The Apalachicola-Chattahoochee-Flint watershed lies in the southeastern United States covering nearly 20,000 square miles. About ¾ of the basin lies in the state of Georgia, and the balance is split nearly evenly between the states of Alabama and Florida. The watershed empties into the Gulf of Mexico and spans a diverse array of landscapes ranging from the Appalachican Mountains to the Piedmont to the Gulf Coastal Plain.

The Apalachicola River is the lower segment of the basin and is formed by the joining of the Flint and Chattahoochee rivers at the Florida border. It empties into Apalachicola Bay. The Chattahoochee river begins just below the North Carolina border and flows past Atlanta to the Alabama/Georgia border and follows the border to where it meets the Flint. Waters in the Chattahoochee originate primarily from surface runoff, and the basin has 14 reservoirs: some privately owned and some federally owned. The largest of these, Lake Lanier, has about two thirds of the conservation storage capacity of the basin but impounds only 10% of the basin. Consequently, the watershed is capable of being highly regulated in its upper reaches but not in its lower reaches.

The Flint River originates just below the city of Atlanta, flows over the fall line and then through the karst region of southwest Georgia until it meets with the Chattahoochee. There are no storage reservoirs on the Flint, and there is a significant ground water contribution to its base flow. The groundwater which flows into the Flint is used extensively for agricultural irrigation in southwest Georgia.

People use the waters of the basin for diverse purposes. These range from reservoir-based recreation and fishing in the upper reaches, to hydropower production at locations throughout the basin, to water supply and wastewater dilution for the Atlanta metropolitan area. The basin is also used for water-based commerce in the lower segments of the river. In Florida, the prominent uses are natural resource-based, including a seafood and tourist industry associated with its estuary.

Background on the Tri-state "Water War"

Because of the abundant rainfall, there has been a widespread perception in the region that there was ample water for all needs in the future. Several droughts in the 1980s began to change this perception. In 1989 the Corps of Engineers proposed to re-allocate water in storage at Lake Lanier from hydropower releases to municipal supply for Metropolitan Atlanta, and they released revised reservoir control manuals for the federal reservoirs in the basin. The State of Georgia also was actively pursuing a regional reservoir construction program to further secure the Atlanta region's long-term water supply needs. This program included the proposed construction of a regional reservoir in the Alabama-Coosa-Tallapoosa basin just upstream from the Alabama border. The State of Alabama reacted to this situation by suing the Corps for failure to comply with the National Environmental Policy Act. Florida was poised to join Alabama in this suit; and Georgia to join the Corps. The so called "Water Wars" were about to begin, and the perception of abundant water changed.

The parties ultimately chose to address their differences through a negotiated agreement rather than through litigation. Critical aspects of the negotiated agreement include provisions which called for the states to consider creation of an interstate coordinating mechanism to deal with water resources issues and the conduct of a long-term comprehensive water resources study of the basin. The agreement pertained to both the Apalachicola-Chattahoochee-Flint (ACF) and Alabama-Coosa-Tallapoosa (ACT) basins. Although the balance of this paper focuses solely on the prior basin, a parallel and connected process is also ongoing for the ACT basin.

Interstate Agreement

With regard to the interstate mechanism, as of March 1997, the Alabama and Georgia Legislatures ratified language establishing a river basin commission, and it is anticipated that identical legislation will be passed by Florida by the end of March. The same legislation must then be passed by the U.S. Congress for the commission to be created.

A key provision in the legislation calls for the establishment of an allocation formula for the waters of the basin. Failure to adopt such a formula by December 1998 will result in the commission's termination. Besides leading to the adoption of the commission, the Comprehensive Study has led to both the collection of data essential for developing an allocation formula and to the development of tools which can be used to evaluate the data and estimate potential impacts from alternative management and usage scenarios.

SHARED VISION MODEL

Purpose and Description of Model

One of these tools which should prove to be crucial to this process is called a "shared vision model". The ACF shared vision model is simply a representation of reality which was jointly developed by the three states and the Corps of Engineers. In this case, the model is simulation of river flow in the ACF basin. The shared vision model process is distinguished from typical model development processes in that key stakeholders and decision-makers are provided the opportunity to be involved in development of the tool rather than being presented a tool which was developed in isolation by technical experts. The intent is that through more intimate involvement in tool development, the probability that the tool will be used to make management decisions are enhanced.

Florida's Approach

From Florida's perspective, the intent in developing this tool was to have a model which 1) provided a good representation of the basin, 2) which was highly flexible so it could be used to evaluate a broad range of management and demand scenarios and 3) which was accessible to a broad range of users and interest groups.

Key interests which have been integrally involved in developing this model include representatives of each state, representatives from the Corps of Engineers, representatives of hydropower interests and metropolitan Atlanta. Other interests have been involved to a lesser extent. The involvement of such a diverse group in model development has helped to ensure that the model does not provide results which are biased in favor of one interest group. Florida has taken steps to coordinate model development with a group of Florida stakeholders to both get their input and help ensure that a broader range of people will be able to utilize the tool once its development was completed. This group has met on a monthly basis for the past several years.

Model Development

The shared vision model of the Apalachicola-Chattahoochee-Flint basin was developed as a tool which allows people to evaluate alternative management options and demand scenarios in a basinwide context. It is focused predominantly on water quantity issues and utilizes a monthly time-step. The basin was divided into broad reaches. Individual withdrawals and returns were assigned to reaches by state representatives as was seen to be appropriate. The demands and withdrawals for each reach were then aggregated for use in the shared vision model. Forecasts of future demands were made by an independent consultant.

The shared vision model is intended to be used for the screening of a broad array of water management alternatives, with the hope of developing a more manageable set of well defined options. These options will then be evaluated through other models which have been developed at a more refined level. HEC-5 for instance, will be used to evaluate alternatives at a daily time step if their evaluation through the shared vision models suggests such an evaluation is warranted.

The shared vision model uses two computer software platforms: Stella and Excel. Stella is an object oriented program which is used to calculate flows at various checkpoints once demand scenarios and management options are defined. The graphical interfaces provided with this program allows users to easily set a variety of parameters.

Excel is used to provide both input data and to assess the output results. Water demand and return data collected as part of the Comprehensive Study are set up in Excel spreadsheets which are linked to the Stella program. These spreadsheets provide the input data to run the Stella program. After the program has been run, the output data are linked to another Excel spreadsheet to allow for more effective use of the output data.

Florida has taken several additional steps to improve access of stakeholders and decision-makers to model results. Output data have been translated from absolute values into difference statistics. Decision-makers can thereby readily interpret the changes from the historical patterns instead of being forced to review absolute numbers. The results have also been linked to a Microsoft Word document which lists both data outputs and a series of questions which forces a rigorous evaluation of output data. It remains to be seen whether a similar process will be used by all study partners.

CONCLUSIONS

It is my conclusion that the shared vision model provides water users and managers an opportunity to proactively decide their long-term fate. The tool can be used both to develop a "basinwide mentality" among the residents and decision-makers in the basin and to screen alternative future scenarios to allow for joint decision making concerning which management path is best suited for all the residents of the basin. Development of the shared vision model has been a collaborative process in which Dr. Richard Palmer and his graduate students at the University of Washington played a crucial role as contractors for the basinwide element of the Comprehensive Study. Whether development of this tool proves to be an academic exercise or whether this tool can help the people of the basin develop and implement a true shared vision of the waters of the basin remains to be seen.